A Record of Twins in the Yellow-bellied Glider, (*Petaurus australis* Shaw) (Marsupialia: Petauridae) with Notes on the Litter Size and Reproductive Strategy of the Species

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The Yellow-bellied Glider, *Petaurus australis* Shaw has attracted considerable interest recently, with various researchers addressing aspects of its biology and ecology (Craig and Belcher, 1980; Kavanagh and Rohan-Jones, 1982; Smith and Russell, 1982; Henry and Craig, 1984; Russell, 1984; Craig, 1985; Goldingay, 1985); however its reproductive physiology and strategy remains poorly understood.

Species in the Family Petauridae are polyoestrous, with the smaller species being polytocous with litters of one to five (Tyndale-Biscoe, 1983), while for *P. australis* this has yet to be conclusively determined.

The pouch morphology of *P. australis* is of particular interest because it is unique among the marsupials in having two compartments separated by a well-developed furred septum (Craig and Belcher, 1980). Fleay (1933) commented that with only two mammae in the pouch, evidently no more than a single young is reared each year. Until recently this was thought to be the case, however on 9 November 1984 a female examined at Wingan Inlet, Victoria (149°29′41″E, 37°44′29″S) was found to be carrying two pouch young. Of thirty-six pouch young records from various localities throughout their range in Queensland, New South Wales and Victoria, this is the first record of twins (Fig. 1). When first noted the twins had a crown rump length of approximately 20 mm, and based on the development of young in the Sugar Glider, *Petaurus breviceps* (Smith, 1979), were born between late October and early November. When examined on 7 January 1985, both young, one of each sex, were well developed and some data relating to their age were recorded (Table 1). Their eyes were closed, ears free and the head, shoulders and back were dark grey; hair was visible on their tail tips. This particular adult female was first examined in August 1980 when she was an adult, and again in November 1981, September 1982, November 1983, November 1984, January 1985 and September 1985. In September 1982 she had a single pouch young and in September 1985, following the last examination of the twins in January 1985, her pouch compartments were heavily stained with both nipples regressed and of equal length. It is not known at this stage if the young were successfully reared to independence.

The lack of twin births in *P. australis* contrasts with that of its smaller congeners in Australia, *P. breviceps* and the Squirrel Glider, *Petaurus norfolcensis*.

Suckling (1984) found that of 116 litters born to *P. breviceps* at his study site, 81% were twins and the remainder single young. Henry (1985) recorded 76% twins and 24% single young from 62 litters. In a captive colony of *P. breviceps* Smith (1979) recorded 33.5% twins and 66.5% single young from 39 births.

Data on litter size in *P. norfolcensis* from the wild is meagre; a search of Fisheries and Wildlife Service records revealed only 2 specimens with pouch young; both were litters of two. Smith (1979) recorded 47% twins and 53% single young from 17 captive births and at the Sir Colin Mackenzie Fauna Park, Healesville, Victoria 40.7% twins and 59.3% single young have been recorded from 27 litters between 1977 and 1985 (Carla Srb, pers. comm.).

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Table 1. Age related measurements of *P. australis* twin pouch young, Wingan Inlet, January, 1985.

Sex	Approx. (weeks) Age	Pes (mm)	Tail (mm)
Male	8	15.4	95.4
Female	8	17.6	103.7

P. australis is found in a variety of forest types throughout its range from south eastern South Australia to north eastern Queensland (Craig and Belcher, 1980; Henry and Craig, 1984; Kavanagh, 1984; Russell, 1984; Craig, 1985) and they have been recorded with pouch young in all months of the year (Fig. 1).

In Victoria 68.8% of pouch young records are between August and December, while in Queensland pouch young have been recorded in all months except November, with 63% occurring between May and September. No data exists for South Australia and is too limited for New South Wales to show any seasonal trends (Fig. 1).

In the wild, when food is seasonally abundant, births in marsupials are generally timed so that the period of weaning or late lactation corresponds with the period of maximum food abundance (Tyndale-Biscoe, 1979). The extended breeding period of *P. australis* highlights the species' versatility in adapting to a wide range of seasonal variations in climate and food availability.

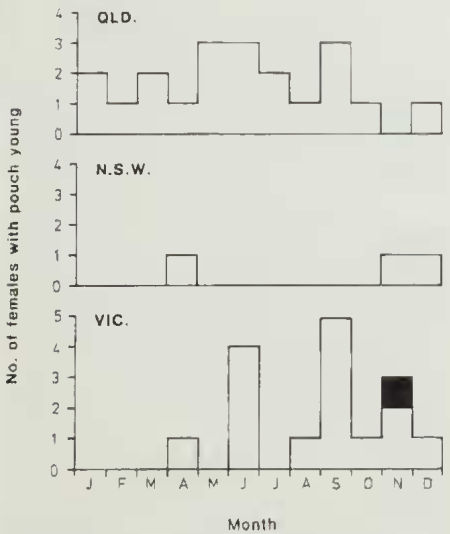

Fig. 1. Approximate birth months for *P. australis* in the wild, 1978-1985. Open columns litters of one; solid column litter of two. Data from Craig (1985), Henry and Craig (1984), R. Goldingay, D. Hespe, R. Kavanagh, G. McKay, M. O'Sullivan and R. Russell unpublished.

At least two of the three species of *Petaurus* found in Australia feed on plant and insect exudates to satisfy the bulk of their energy requirements. *Petaurus breviceps* favours *Acacia* gum and sap from Apple Box, *Eucalyptus bridgesiana* and nectar (Smith, 1982). *P. australis* favours the sap from many different species of eucalyptus and two species of *Angophora* as well as nectar and insect exudates (Craig and Belcher, 1980; Smith and Russell, 1982; Henry and Craig, 1984; Craig, 1985, Craig, unpub. data). The diet of *P. norfolcensis* is not well known and is currently under investigation in Victoria. Preliminary results suggest their diet consists primarily of arboreal insects, the significance of plant exudates being unclear at present (P. Menkhorst, pers. comm.)

Despite the similarities in their diet and feeding behaviour, adult body weights are about 130 g, 230 g and 630 g for *P. breviceps*, *P. norfolcensis* and *P. australis* respectively (Craig, 1985; Suckling, 1983).

Sap, gum, nectar and insect feeders in the Family Petauridae are characterised by medium-small size, low protein diets and consequently reduced offspring production rates, small litters and increased longevity (Smith and Lee, 1984). It has been argued that since litter size and litter frequency increase with decreasing body size in mammals, that animals should be small whenever possible and large size should be considered a specialised response

to specific ecological or socio-biological constraints (McNab, 1980; Clutton-Broek and Harvey, 1982). Smith and Lee (1984) argued that body size is an important determinant of female reproductive strategy through its influence on growth rates and metabolism but that low protein and high fibre diets may depress reproductive rates below maximum levels set by physiological laws of scaling. Smith and Lee (1984) hypothesised that litter size in the petaurid phalangeroids has been constrained by the low proportion of protein (insects and pollen) relative to energy (nectar, saps, gums, honeydew) available in their forest environments.

The mean litter size of the three species of Australian *Petaurus* shows a decrease in the incidence of twins with an increase in body size, (Smith and Lee, 1984) with litters of two in the largest species, *P. australis* being a rare occurrence. All available data for this species suggests that their large size, combined with their specialised diet, necessitates a large home-range in order to satisfy the bulk of their energy requirements (Henry and Craig, 1984; Craig, 1985), resulting in generally low population densities throughout their range, compared with the other species of *Petaurus,* and a specialised reproductive strategy. The majority of females give birth to a single young every second year (Craig, 1985) suggesting that the species would need to be long-lived in order to maximise reproductive potential, thus maintaining adequate population levels under natural conditions.

The reproductive strategies of *Petaurus* species require further investigation in a variety of forest environments throughout their range. An area where all three species occur together, such as in the Kiola State Forest in New South Wales (Davey, 1984) presents the opportunity to compare their habitat use, food resource partitioning and reproductive strategies.

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Mirbelia pungens Cunn. ex G. Don (Papilionaceae): A New Species Record for Victoria

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One might imagine that after 200 years of occupation and almost as long a history of biological exploration, the flora of this state would be thoroughly documented and, save for the ever-increasing weed flora and casual or short-lived plant introductions, Victoria's plant register would be complete. However, the current census of the vascular plants of Victoria (Forbes *et al.*, 1984) indicates that this is certainly not the case, listing 4040 currently accepted species, subspecies and varieties compared with about 3500 in 1973 when J. H. Willis' *Handbook to the Plants in Victoria* was published.

The number of taxa continues to grow with the recent discovery of *Mirbelia pungens*, a small pea-flowered shrub in the Mt. Coopracambra region of East Gippsland.

The genus *Mirbelia* (with 27 species), a member of the Tribe Mirbelieae, is endemic in Australia occuring in all states except South Australia and Tasmania. It is included in that group of peas commonly known as "eggs and bacon" but is distinguished from other genera in the Mirbelieae by the pod which has a thin longitudinal partition between the two valves. Victoria has two other species of *Mirbelia* viz. *M. oxylobioides* F. Muell., an erect shrub to 1.8 m tall, widespread in the drier mountainous regions (with a couple of outlying lowland populations near Creswick and Bairnsdale) and *M. rubiifolia* (Andrews) G. Don, a fine-stemmed semi-shrub known in Victoria only from coastal heathland near Mallacoota and not discovered in this state until 1979 (see Fig. 1).

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Description of *Mirbelia pungens*

A prostrate to weakly ascending semi-shrub to 0.4 m tall with stems up to 0.6 m long; younger stems covered by short, semi-appressed hairs, older stems glabrous. Leaves sessile (unstalked), alternate or irregularly in whorls of 3, narrow linear, 10-15 mm long x 1 mm wide, narrowed at the apex to a fine sharp point; margins tightly recurved and almost concealing the undersurface, often leaving the raised, hairy midvein exposed; upper surface glabrous, the lateral veins slightly raised. Flowers virtually sessile, solitary or paired